checked by NT
4/4/17

CERTIFICATION

SDG No:	1701454R1	Laboratory:	Eurofins, Folson, CA
Site:	BMSMC	Matrix:	Air

SUMMARY: Air samples (Table 1) were collected on the BMSMC facility. The BMSMC facility is located in Humacao, PR. Samples were taken January 29, 2017 and were analyzed in Eurofins Laboratory of Folson, California that reported the data under SDG No.: 1701454R1. The sample results were assessed according to USEPA the documents described in the following order of precedence: QC criteria from "Compendium Method TO-17. Determination of Volatile Organic Compounds (VOCs) In Ambient Air Using Active Sampling Onto Sorbent Tubes (modified), January, 1999"; In addition the following guideline is employed for set up of the GC/MS analytical system including column selection, MS tune requirements, calibration protocols, etc., as per TO-17 method requirements: USEPA Hazardous Waste Support Branch. Validating Air Samples. Volatile Organic Analysis of Ambient Air in Canisters by Method TO-15, (SOP # HW-31. Revision #6. June, 2014).The analyses performed are shown in Table 1. Individual data review worksheets are enclosed for each target analyte group. The data sample summary form shows analyte results that were qualified.

In summary, the results are valid and can be used for decision making purposes.

Table 1. Samples analyzed and analysis performed

SAMPLE ID	SAMPLE DESCRIPTION	MATRIX	ANALYSIS PERFORMED
1701454R1-01A	B1315AA-012817	Air	Naphthalene
1701454R1-02A	B13IA-1-012817	Air	Naphthalene
1701454R1-03A	B13IA-3-012817	Air	Naphthalene
1701454R1-04A	B13IA-2-012817	Air	Naphthalene
1701454R1-05A	B13IA-2DUP-012817	Air	Naphthalene
1701454R1-06A	B13SS-1-012917	Air	Naphthalene
1701454R1-07A	B13SS-2-012917	Air	Naphthalene
1701454R1-08A	B13SS-2DUP-012917	Air	Naphthalene
1701454R1-09A	B13SS-3-012917	Air	Naphthalene
1701454R1-10A	B15S-1-012917	Air	Naphthalene
1701454R1-11A	B15S-1DUP-012917	Air	Naphthalene
1701454R1-12A	B15FB-012917	Air	Naphthalene
1701454R1-13A	B15IA-1DUP-012817	Air	Naphthalene
1701454R1-14A	B15IA-1-012817	Air	Naphthalene

Reviewer Name: Rafael Infante
Chemist License 1888

Signature:

Date: March 28, 2017

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Client Sample ID: B1315AA-012817

Lab ID#: 1701454R1-01A

EPA METHOD TO-17

File Name:	**6013112R1**	**Date of Extraction: NA**	**Date of Collection: 1/29/17 12:15:00 AM**
Dil. Factor:	**1.00**		**Date of Analysis: 1/31/17 03:53 PM**

Compound	Rpt. Limit (ng)	Rpt. Limit (ug/m3)	Amount (ng)	Amount (ug/m3)
Naphthalene	1.0	0.058	Not Detected	Not Detected

Air Sample Volume(L): 17.3
Container Type: TO-17 VI Tube

Surrogates	%Recovery	Method Limits
Naphthalene-d8	92	50-150

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Client Sample ID: B13IA-1-012817
Lab ID#: 1701454R1-02A
EPA METHOD TO-17

File Name:	**6013113R1**	**Date of Extraction: NA**	**Date of Collection: 1/29/17 2:45:00 PM**
Dil. Factor:	**1.00**		**Date of Analysis: 1/31/17 04:33 PM**

Compound	Rpt. Limit (ng)	Rpt. Limit (ug/m3)	Amount (ng)	Amount (ug/m3)
Naphthalene	1.0	0.061	Not Detected	Not Detected

Air Sample Volume(L): 16.3
Container Type: TO-17 VI Tube

Surrogates	%Recovery	Method Limits
Naphthalene-d8	92	50-150

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Client Sample ID: B13IA-3-012817

Lab ID#: 1701454R1-03A

EPA METHOD TO-17

File Name:	**6013114R1**	**Date of Extraction: NA**	**Date of Collection: 1/29/17 2:52:00 PM**
Dil. Factor:	**1.00**		**Date of Analysis: 1/31/17 05:13 PM**

Compound	Rpt. Limit (ng)	Rpt. Limit (ug/m3)	Amount (ng)	Amount (ug/m3)
Naphthalene	1.0	0.059	Not Detected	Not Detected

Air Sample Volume(L): 17.0
Container Type: TO-17 VI Tube

Surrogates	%Recovery	Method Limits
Naphthalene-d8	95	50-150

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Client Sample ID: B131A-2-012817

Lab ID#: 1701454R1-04A

EPA METHOD TO-17

File Name:	**6013115R1**	**Date of Extraction: NA**	**Date of Collection: 1/29/17 3:08:00 PM**
Dil. Factor:	**1.00**		**Date of Analysis: 1/31/17 05:53 PM**

Compound	Rpt. Limit (ng)	Rpt. Limit (ug/m3)	Amount (ng)	Amount (ug/m3)
Naphthalene	1.0	0.060	0.61 J	0.036 J

Air Sample Volume(L): 16.8

J = Estimated value.

Container Type: TO-17 VI Tube

Surrogates	%Recovery	Method Limits
Naphthalene-d8	92	50-150

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Client Sample ID: B13IA-2DUP-012817

Lab ID#: 1701454R1-05A

EPA METHOD TO-17

File Name:	**6013116R1**	**Date of Extraction: NA**	**Date of Collection: 1/29/17 3:08:00 PM**
Dil. Factor:	**1.00**		**Date of Analysis: 1/31/17 06:33 PM**

Compound	Rpt. Limit (ng)	Rpt. Limit (ug/m3)	Amount (ng)	Amount (ug/m3)
Naphthalene	1.0	0.060	Not Detected	Not Detected

Air Sample Volume(L): 16.8
Container Type: TO-17 VI Tube

Surrogates	%Recovery	Method Limits
Naphthalene-d8	103	50-150

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Client Sample ID: B13SS-1-012917

Lab ID#: 1701454R1-06A

EPA METHOD TO-17

File Name:	**6013117R1**	**Date of Extraction: NA**	**Date of Collection: 1/29/17 3:17:00 PM**
Dil. Factor:	**1.00**		**Date of Analysis: 1/31/17 07:13 PM**

Compound	Rpt. Limit (ng)	Rpt. Limit (ug/m3)	Amount (ng)	Amount (ug/m3)
Naphthalene	1.0	2.5	Not Detected	Not Detected

Air Sample Volume(L): 0.400
Container Type: TO-17 VI Tube

Surrogates	%Recovery	Method Limits
Naphthalene-d8	96	50-150

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Client Sample ID: B13SS-2-012917

Lab ID#: 1701454R1-07A

EPA METHOD TO-17

File Name:	**6013118R1**	**Date of Extraction: NA**	**Date of Collection: 1/29/17 4:05:00 PM**
Dil. Factor:	**1.00**		**Date of Analysis: 1/31/17 07:52 PM**

Compound	Rpt. Limit (ng)	Rpt. Limit (ug/m3)	Amount (ng)	Amount (ug/m3)
Naphthalene	1.0	2.5	Not Detected	Not Detected

Air Sample Volume(L): 0.400
Container Type: TO-17 VI Tube

Surrogates	%Recovery	Method Limits
Naphthalene-d8	93	50-150

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Client Sample ID: B13SS-2DUP-012917

Lab ID#: 1701454R1-08A

EPA METHOD TO-17

File Name:	**6013119R1**	**Date of Extraction: NA**	**Date of Collection: 1/29/17 4:01:00 PM**
Dil. Factor:	**1.00**		**Date of Analysis: 1/31/17 08:32 PM**

Compound	Rpt. Limit (ng)	Rpt. Limit (ug/m3)	Amount (ng)	Amount (ug/m3)
Naphthalene	1.0	2.5	0.86 J	2.2 J

Air Sample Volume(L): 0.400

J = Estimated value.

Container Type: TO-17 VI Tube

Surrogates	%Recovery	Method Limits
Naphthalene-d8	104	50-150

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Client Sample ID: B13SS-3-012917
Lab ID#: 1701454R1-09A
EPA METHOD TO-17

File Name:	**6013120R1**	**Date of Extraction: NA**	**Date of Collection: 1/29/17 3:41:00 PM**
Dil. Factor:	**1.00**		**Date of Analysis: 1/31/17 09:11 PM**

Compound	Rpt. Limit (ng)	Rpt. Limit (ug/m3)	Amount (ng)	Amount (ug/m3)
Naphthalene	1.0	2.5	Not Detected	Not Detected

Air Sample Volume(L): 0.400
Container Type: TO-17 VI Tube

Surrogates	%Recovery	Method Limits
Naphthalene-d8	94	50-150

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Client Sample ID: B15S-1-012917
Lab ID#: 1701454R1-10A
EPA METHOD TO-17

File Name:	**6013121R1**	**Date of Extraction: NA**	**Date of Collection: 1/29/17 5:37:00 PM**
Dil. Factor:	**1.00**		**Date of Analysis: 1/31/17 09:51 PM**

Compound	Rpt. Limit (ng)	Rpt. Limit (ug/m3)	Amount (ng)	Amount (ug/m3)
Naphthalene	1.0	2.5	0.83 J	2.1 J

Air Sample Volume(L): 0.400
J = Estimated value.
Container Type: TO-17 VI Tube

Surrogates	%Recovery	Method Limits
Naphthalene-d8	96	50-150

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Client Sample ID: B15SS-1DUP-012917

Lab ID#: 1701454R1-11A

EPA METHOD TO-17

File Name:	**6013122R1**	**Date of Extraction: NA**	**Date of Collection: 1/29/17 5:43:00 PM**
Dil. Factor:	**1.00**		**Date of Analysis: 1/31/17 10:31 PM**

Compound	Rpt. Limit (ng)	Rpt. Limit (ug/m3)	Amount (ng)	Amount (ug/m3)
Naphthalene	1.0	2.5	0.47 J	1.2 J

Air Sample Volume(L): 0.400

J = Estimated value.

Container Type: TO-17 VI Tube

Surrogates	%Recovery	Method Limits
Naphthalene-d8	92	50-150

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Client Sample ID: B15FB-012917

Lab ID#: 1701454R1-12A

EPA METHOD TO-17

File Name:	**6013111R1**	**Date of Extraction: NA**	**Date of Collection: 1/29/17 5:35:00 PM**
Dil. Factor:	**1.00**		**Date of Analysis: 1/31/17 03:13 PM**

Compound	Rpt. Limit (ng)	Rpt. Limit (ug/m3)	Amount (ng)	Amount (ug/m3)
Naphthalene	1.0	0.058	Not Detected	Not Detected

Air Sample Volume(L): 17.3
Container Type: TO-17 VI Tube

Surrogates	%Recovery	Method Limits
Naphthalene-d8	72	50-150

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Client Sample ID: B15IA-1DUP-012817

Lab ID#: 1701454R1-13A

EPA METHOD TO-17

File Name:	**6013124R1**	**Date of Extraction: NA**	**Date of Collection: 1/29/17 3:50:00 PM**
Dil. Factor:	**1.00**		**Date of Analysis: 1/31/17 11:10 PM**

Compound	Rpt. Limit (ng)	Rpt. Limit (ug/m3)	Amount (ng)	Amount (ug/m3)
Naphthalene	1.0	0.059	Not Detected	Not Detected

Air Sample Volume(L): 17.0
Container Type: TO-17 VI Tube

Surrogates	%Recovery	Method Limits
Naphthalene-d8	101	50-150

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Client Sample ID: B15IA-1-012817
Lab ID#: 1701454R1-14A
EPA METHOD TO-17

File Name:	**6013125R1**	**Date of Extraction: NA**	**Date of Collection: 1/29/17 3:50:00 PM**
Dil. Factor:	**1.00**		**Date of Analysis: 1/31/17 11:50 PM**

Compound	Rpt. Limit (ng)	Rpt. Limit (ug/m3)	Amount (ng)	Amount (ug/m3)
Naphthalene	1.0	0.060	1.2	0.070

Air Sample Volume(L): 16.8
Container Type: TO-17 VI Tube

Surrogates	%Recovery	Method Limits
Naphthalene-d8	89	50-150

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180 BLUE RAVINE RD. SUITE B
FOLSOM, CA 95630-1020
916-985-1000 main line
916-985-1020 fax line

Sample Transportation Notice

Relinquishing signature on this document indicates that sample is being shipped in compliance with all applicable local, State, Federal, national, and international laws, regulations and ordinances of any kind. Air Toxics Limited assumes no liability with respect to the collection handling or shipping of these samples. Relinquished signature also indicated agreement to hold harmless, defend, and indemnify Air Toxics Limited against any claim, demand, or action of any kind, related to the collection, handling, or shipping of samples. D.O.T. Hotline (800) 467-4922.

Chain-of-Custody Record

TO-17

Project Manager: Terry Taylor
Company: Anderson Mulholland & Associates, Inc.
Address: 2700 Winchester, Suite 417 City: Purchase State: NY Zip: 10577
Phone: 914-251-0400, ext. 309 FAX:
Collected By (print and sign): David Lindstrand

Project Information:
P.O. #
Project #
Project Name: BMS VI Invest. Buildings 8, 13, 15, 18, and 30

Turn Around Time:
☒ Normal
☐ Rush Specify

Reporting Units:
☐ ppmv
☐ ppbv
☒ ug/m3
☐ mg/m3

Lab I.D.	Field Sample I.D.	Tube/ Cartridge	Date of Collection	Start Time	End Time	Duration	Final Volume l	Analysis Requested
01A	B13SAA-012817	147257	1/29/17	1615	0015	480 min	5.7 17.3	Naphthalene
02A	B13IA-1-012817	152217	1/29/17	1445	1445	480 min	16.3	Naphthalene
03A	B13IA-3-012817	153670	1/29/17	1452	1452	480 min	17.0	NAP
04A	B13IA-2-012817	147082	1/29/17	1505	1505	480 min	16.8	Naphthalene
05A	B13IA-2DUP-012817	144403	1/29/17	1508	1508	480 min	16.8	Naphthalene
06A	B13SS-1-012917	149600	1/29/17	1514	1517	3 min	0.40	Naphthalene
07A	B13SS-2-012917	145582	1/29/17	1602	1605	3 min	0.40	Naphthalene
08A	B13SS-2DUP-012917	149756	1/29/17	1558	1601	3 min	0.40	Naphthalene
09A	B13SS-3-012917	137150	1/29/17	1538	1541	3 min	0.40	Naphthalene
10A	B15SS-1-012917	160540	1/29/17	1734	1737	3 min	0.40	Naphthalene

Relinquished By: (Signature) Date/Time: 30 Jan 17 1700
Received By: (Signature) Date/Time: Fed Ex
Relinquished By: (Signature) Date/Time:
Received By: (Signature) Date/Time: EATL 1/31/17 1032
Relinquished By: (Signature) Date/Time:
Received By: (Signature) Date/Time:

Pump Calibration Information
Pre-test Flow Rate: 35 ml/min
Post-test Flow Rate: 37 ml/min
Average Flow Rate: 36 ml/min

Notes:

Lab Use Only

Shipper Name	Air Bill #	Opened By	Temp ©	Condition	Custody Seals	Work Order #
FedEx		KK	12.9°C	SDR	Yes No (None)	1701454

Air Toxics LTD.

Sample Transportation Notice

Relinquishing signature on this document indicates that sample is being shipped in compliance with all applicable local, State, Federal, national, and international laws, regulations and ordinances of any kind. Air Toxics Limited assumes no liability with respect to the collection handling or shipping of these samples. Relinquished signature also indicated agreement to hold harmless, defend, and indemnify Air Toxics Limited against any claim, demand, or action of any kind, related to the collection, handling, or shipping of samples. D.O.T. Hotline (800) 467-4922.

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FOLSOM, CA 95630-1020
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916-985-1020 fax line

Chain-of-Custody Record

TO-17

Project Manager: Terry Taylor
Company: Anderson Mulholland & Associates, Inc.
Address: 2700 Winchester, Suite 417 City: Purchase State: NY Zip: 10577
Phone: 914-251-0400, ext. 309 FAX:
Collected By (print and sign): David Lindstrand

Project Information:
P.O. #
Project #
Project Name: BMS VI Invest. Buildings 8, 13, 15, 18, and 30

Turn Around Time:
☒ Normal
☐ Rush Specify

Reporting Units:
☐ ppmv
☒ ppbv
☒ ug/m3
☐ mg/m3

Lab I.D.	Field Sample I.D.	Tube/ Cartridge	Date of Collection	Start Time	End Time	Duration	Final Volume l	Analysis Requested
11A	BISSS-1DUP-012917	155282	1/29/17	1740	1743	3min	0.40	Naphthalene
12A	BISFB-012917	143458	1/29/17	1735	1735	—	—	Naphthalene
13A	BISIA-1DUP-012817	140142	1/29/17	1550	1550	480min	17.0	Naphthalene
14A	BISIA-1-012817	146189	1/29/17	1550	1550	480 min	16.8	Naphthalene

Relinquished By: (Signature) Date/Time: 30Jan17 1700 Fed Ex
Received By: (Signature) Date/Time:
Relinquished By: (Signature) Date/Time:
Received By: (Signature) Date/Time: EATL 1/31/17 1020
Relinquished By: (Signature) Date/Time:
Received By: (Signature) Date/Time:

Pump Calibration Information
Pre-test Flow Rate:
Post-test Flow Rate:
Average Flow Rate:

Notes:

Lab Use Only

Shipper Name	Air Bill #	Opened By	Temp ©	Condition	Custody Seals	Work Order #
Fedex		KK	12.9°C	SDR	Yes No (None)	1701454

EXECUTIVE NARRATIVE

SDG No:	**1701454R1**	Laboratory:	**Eurofins, Folson, CA**
Analysis:	**TO-17**	Number of Samples:	**14**
Location:			

SUMMARY: Fourteen (14) samples were analyzed for the naphthalene in ambient air following Compendium Method TO-17. The sample results were assessed according to USEPA the documents described in the following order of precedence: QC criteria from "Compendium Method TO-17. Determination of Volatile Organic Compounds (VOCs) In Ambient Air Using Active Sampling Onto Sorbent Tubes (modified), January, 1999"; In addition the following guideline is employed for the evaluation of the set-up of the GC/MS analytical system including column selection, MS tune requirements, calibration protocols, etc., as per TO-17 method requirements: USEPA Hazardous Waste Support Branch. Validating Air Samples. Volatile Organic Analysis of Ambient Air in Canisters by Method TO-15, (SOP # HW-31. Revision #6. June, 2014). The QC criteria and data validation actions listed on the data review worksheets are from the primary guidance document, unless otherwise noted.

Results are valid and can be used for decision making purposes.

Critical issues:	**None**
Major:	**None**
Minor:	**None**

Critical findings:	**None**
Major findings:	**None**
Minor findings:	**1.** Laboratory/field duplicates analyzed as part of this data set. Laboratory duplicate were within method performance criteria.
	Field duplicate RPD within method performance criteria except for the cases described in the Data Review Worksheet. No action taken sample/duplicate concentration < 5 x SQL.

COMMENTS: Results are valid and can be used for decision making purposes.

Reviewers Name: Rafael Infante
Chemist License 1888

Signature: Rafael Infante

Date: March 28, 2017

NAPHTHALENE DATA SAMPLE SUMMARY

METHOD: TO-17

		NAPHTHALENE - TO 17					
Sample ID	Date	Results	Units	Dilution Factor	Lab Flag	Validation	Reportable
1701454R1-01A	1/29/2017	1.0	ng	1.0	-	U	Yes
1701454R1-02A	1/29/2017	1.0	ng	1.0	-	U	Yes
1701454R1-03A	1/29/2017	1.0	ng	1.0	-	U	Yes
1701454R1-04A	1/29/2017	0.61	ng	1.0	J	J	Yes
1701454R1-05A	1/29/2017	1.0	ng	1.0	-	U	Yes
1701454R1-06A	1/29/2017	1.0	ng	1.0	-	U	Yes
1701454R1-07A	1/29/2017	1.0	ng	1.0	-	U	Yes
1701454R1-08A	1/29/2017	0.86	ng	1.0	J	J	Yes
1701454R1-09A	1/29/2017	1.0	ng	1.0	-	U	Yes
1701454R1-10A	1/29/2017	0.83	ng	1.0	J	J	Yes
1701454R1-11A	1/29/2017	0.47	ng	1.0	-	U	Yes
1701454R1-12A	1/29/2017	1.0	ng	1.0	-	U	Yes
1701454R1-13A	1/29/2017	1.0	ng	1.0	-	U	Yes
1701454R1-14A	1/29/2017	1.2	ng	1.0	-	-	Yes

DATA REVIEW WORKSHEETS

Project Number:__1701454R1__
Date:_____01/29/2017___

REVIEW OF VOLATILE ORGANIC PACKAGE

The following guidelines for evaluating volatile organics were created to delineate required validation actions. This document will assist the reviewer in using professional judgment to make more informed decision and in better serving the needs of the data users. The sample results were assessed according to USEPA the documents described in the following order of precedence: QC criteria from "Compendium Method TO-17. Determination of Volatile Organic Compounds (VOCs) In Ambient Air Using Active Sampling Onto Sorbent Tubes (modified), January, 1999"; In addition the following guideline is employed for the evaluation of the set-up of the GC/MS analytical system including column selection, MS tune requirements, calibration protocols, etc., as per TO-17 method requirements: USEPA Hazardous Waste Support Branch. Validating Air Samples. Volatile Organic Analysis of Ambient Air in Canisters by Method TO-15, (SOP # HW-31. Revision #6. June, 2014). The QC criteria and data validation actions listed on the data review worksheets are from the primary guidance document, unless otherwise noted.
The hardcopied (laboratory name) _Eurofins_-_Air_Toxics_____ data package received has been reviewed and the quality control and performance data summarized. The data review for VOCs included:

Lab. Project/SDG No.: __1701454R1_____ Sample matrix: ___Air_____
No. of Samples: _____14_____

Trip blank No.: _____-_____
Field blank No.: _____B15FB-012917_____
Equipment blank No.:___-_____
Field duplicate No.:_B13IA-2-012817/B13IA-2DUP-012817;_B13SS-2-012917/B13SS-2DUP-__012917;_B15S-1-012917/B15S-1DUP-012917;_B15IA-1-012817/B15IA-1DUP-012817_____

___X___ Data Completeness
___X___ Holding Times
___X___ GC/MS Tuning
___X___ Internal Standard Performance
___X___ Blanks
___X___ Surrogate Recoveries
___X___ Laboratory Control Spikes
___X___ Field Duplicates
___X___ Calibrations
___X___ Compound Identifications
___X___ Compound Quantitation
___X___ Quantitation Limits

Overall Comments:_____Naphthalene_by_method_TO-17_(modified)_detection_by_full_scan__
_GC/MS_____

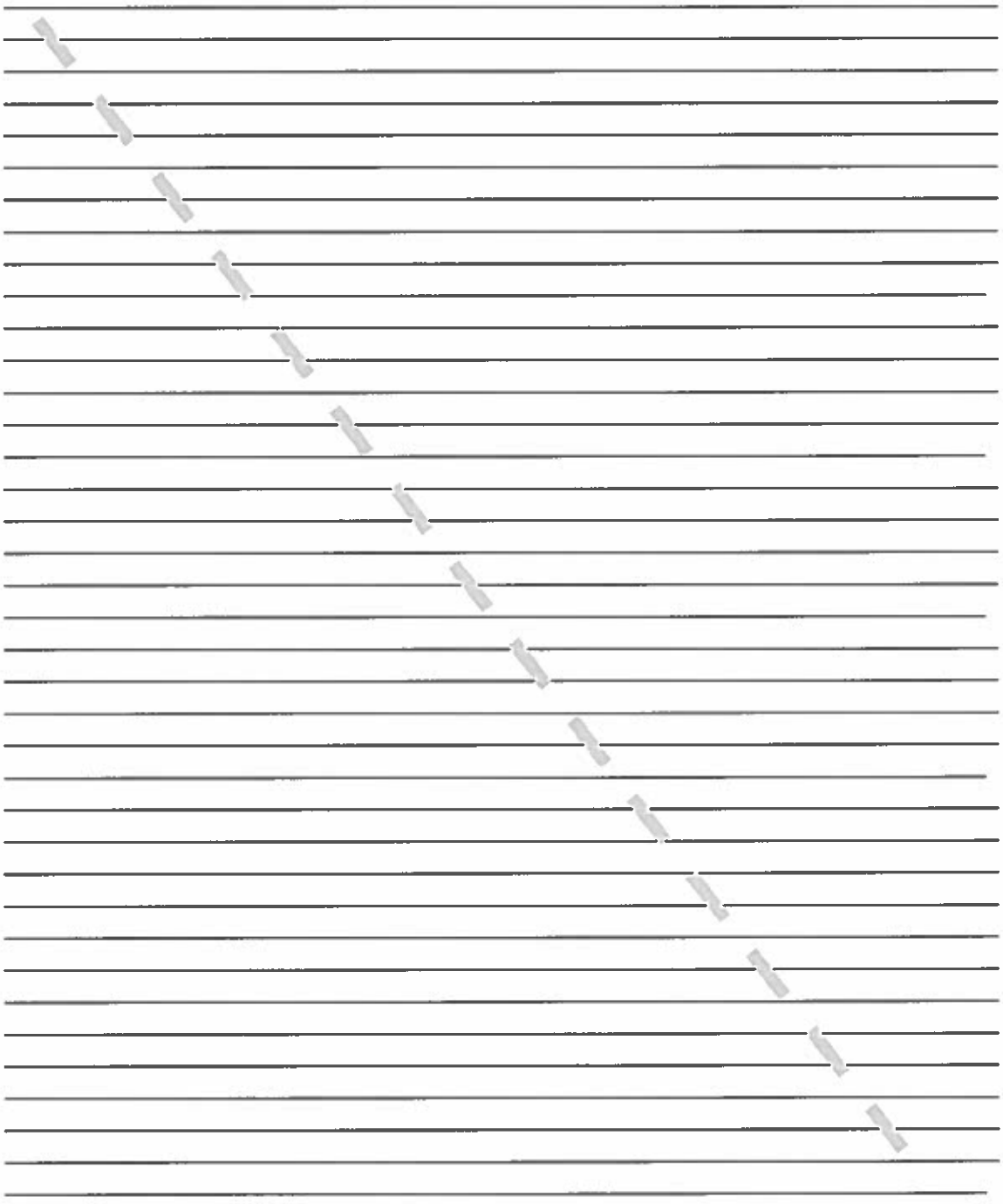
Definition of Qualifiers:
J- Estimated results
U- Compound not detected
R- Rejected data
UJ- Estimated nondetect

Reviewer:_____ Rafael Infante _____
Date:_____03/28/2017_____

DATA REVIEW WORKSHEETS

DATA COMPLETENESS

MISSING INFORMATION	DATE LAB. CONTACTED	DATE RECEIVED



DATA REVIEW WORKSHEETS

All criteria were met __X__
Criteria were not met
and/or see below _____

HOLDING TIMES

The objective of this parameter is to ascertain the validity of the results based on the holding time of the sample from time of collection to the time of analysis.

Complete table for all samples and note the analysis and/or preservation not within criteria

SAMPLE ID	DATE SAMPLED	DATE ANALYZED	> 10% difference in sample flow rate (beginning/end)	ACTION
All samples analyzed within the recommended method holding time. Samples received in good conditions and no receiving discrepancies were observed except the cases described in this document. A Temperature Blank was included with the shipment. Temperature was measured and was not within 4±2 °C. Coolant in the form of blue ice was present. Analysis proceeded; no action taken professional judgment. Pump calibration information included in data package.				

Criteria

Samples should be refrigerated at <4°C in a clean environment during storage and analyzed within 30 days of sample collection (within one week for limonene, carene, *bis*-chloromethyl ether and labile sulfur or nitrogen containing volatiles). Samples taken on tubes containing multiple sorbent beds should be analyzed as soon as possible after sampling unless it is know in advance that storage will not cause significant sample recovery errors.

Receiving temperature: 12.9 °C

Actions

If holding times are exceeded use professional judgment to qualify positive results and non-detects.

Performance Criteria for the Monitoring Pump

Sampling pump errors can normally be presumed to be in the order of 5% (8). If the pump sampling flow rate measured at the end of sample collection varies more than 10% from that measured at the beginning of sample collection, then that sample is invalidated.

DATA REVIEW WORKSHEETS

All criteria were met __X__
Criteria were not met see below ____

GC/MS TUNING

The assessment of the tuning results is to determine if the sample instrumentation is within the standard tuning QC limits. The following actions from the TO-15 compendium method are employed.

Gas Chromatograph/Mass Spectrometer (GC/MS) Instrument Performance Check

Action:

NOTES: This requirement does not apply when samples are analyzed by the Selected Ion Monitoring (SIM) technique.
All mass spectrometer instrument conditions must be identical to those used during the sample analysis. Background subtraction actions resulting in spectral distortions for the sole purpose of meeting the method specifications are contrary to the Quality Assurance (QA) objectives, and are therefore unacceptable.

NOTES: No data should be qualified based on BFB or DFTTP failure. Instances of this should be noted in the narrative.
All ion abundance ratios must be normalized to m/z 95, the nominal base peak, even though the ion abundance of m/z 174 may be up to 120% that of m/z 95.

1. If samples are analyzed without a preceding valid instrument performance check, qualify all data in those samples as unusable (R).
2. If the laboratory has made minor transcription errors which do not significantly affect the data, the data reviewer should make the necessary corrections on a copy of the form.
3. If the laboratory has failed to provide the correct forms or has made significant transcription or calculation errors, the Region's designated representative should contact the laboratory and request corrected data. If the information is not available, the reviewer must use professional judgment to assess the data and notify the Project Officer (PO).
4. If ion abundance criteria are not met, professional judgment may be applied to determine to what extent the data may be utilized. When applying professional judgment to this topic, the most important factors to consider are the empirical results that are relatively insensitive to location on the chromatographic profile and the type of instrumentation. Therefore, the critical ion abundance criteria for BFB are the m/z 95/96, 174/175, 174/176, and 176/177 ratios. The relative abundances of m/z 50 and 75 are of lower importance. This issue is more critical for Tentatively Identified Compounds (TICs) than for target analytes.
5. Note, in the Data Review Narrative, decisions to use analytical data associated with BFB instrument performance check failures (not meeting contract requirements).
6. If the reviewer has reason to believe that instrument performance check criteria were achieved using techniques other than those described in the Compendium method TO-15 entitled "Determination Of Volatile Organic Compounds(VOCs) In Air Collected In Specially-Prepared Canisters And Analyzed By Gas Chromatography/Mass Spectrometry(GC/MS)", section 10.4, obtain additional information on the instrument performance checks. If the techniques employed are found to be at variance with the contract requirements, the performance and procedures of the laboratory may merit evaluation.
7. Use professional judgment to determine whether associated data should be qualified based on the spectrum of the mass calibration compound.

DATA REVIEW WORKSHEETS

__X___ The BFB performance results were reviewed and found to be within the specified criteria.

__X___ BFB tuning was performed for every 24 hours of sample analysis.

If no, use professional judgment to determine whether the associated data should be accepted, qualified or rejected.

List the samples affected:

_____

_____

_____

If mass calibration is in error, all associated data are rejected.

DATA REVIEW WORKSHEETS

All criteria were met __X__
Criteria were not met
and/or see below ____

CALIBRATION VERIFICATION

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing and maintaining acceptable quantitative data. The calibration criteria and appropriate actions from the compendium method TO-15 are employed.

Date of initial calibration:_____01/27/17____
Dates of continuing calibration:___01/31/17____
Instrument ID numbers:____MSD-6_____
Matrix/Level:_____Air/low_____

DATE	LAB FILE ID#	CRITERIA OUT RFs, %RSD, %D, r	COMPOUND	SAMPLES AFFECTED
Initial and continuing calibrations meet method specific requirements. Initial calibration retention times meet method specific requirements.				

The following criteria apply:

Table 5. Initial Calibration Actions for TO-15 Analyses

Criteria for TO-15 Analysis	Action	
	Detected Associated Compounds	Non-Detected Associated Compounds
RRF < 0.010 (poor response volatile target compounds, Table 4) RRF < 0.050 (all other volatile target compounds)	J (based on mass spectral identification)	R
RRF > 0.010 (poor response volatile target compounds, Table 4) RRF > 0.050 (all other volatile target compounds)	No qualification	
% RSD > 40.0 or < -40.0 (poor response volatile target compounds, Table 4) % RSD > 30.0 or < -30.0 (all other Volatile target compounds)	No qualification	
% RSD < 40.0 and > -40.0 (poor response volatile target compounds, Table 4) % RSD < 30.0 and > -30.0 (all other volatile target compounds)	J	Use professional judgment

Table 6. Continuing Calibration Verification (CCV) Actions for TO-15 Analyses

Criteria for CCV	Action	
	Detected Associated Compounds	Non-Detected Associated Compounds
RRF < 0.010 (poor response volatile target compounds, Table 4) RRF < 0.050 (all other volatile target compounds)	J (based on mass spectral identification)	R
RRF > 0.010 (poor response volatile target compounds, Table 4) RRF > 0.050 (all other volatile target compounds)	No qualification	
%D > 40.0 or < -40.0 (poor response volatile target compounds, Table 4) %D > 30.0 or < -30.0 (all other Volatile target compounds)	J	UJ
%D < 40.0 and > -40.0 (poor response volatile target compounds, Table 4) %D < 30.0 and > -30.0 (all other volatile target compounds)	No qualification	

If the % D for daily calibration exceeds -90, use professional judgment to see if non-detects nee to be qualified as unusable "R"

A separate worksheet should be filled for each initial curve

Table 4. TO 15 Volatile Compounds List*

Compound	CAS Number	Synonyms
Acetone	67-64-1	Dimethyl ketone; Dimethylformaldehyde; 2-Propanone
Allyl chloride	107-05-1	3-Chloropropene; 3-Chloroprene
Benzene	71-43-2	Benzol; Benzine
Benzyl chloride	100-44-7	Chloromethylbenzene; alpha-Chlorotoluene
Bromodichloromethane	75-27-4	Monobromodichloromethane; Methane-bromodichloro
Bromoethene	593-60-2	Vinyl bromide; Monobromoethene
Bromoform	75-25-2	Tribromoethane
Bromomethane	74-83-9	Methyl bromide; Monobromomethane
1.3-Butadiene	106-99-0	Biethylene; Erythrene; Pyrrolyene
Carbon disulfide	***75-15-0***	***Carbon bisulfide; Carbon sulfide***
Carbon tetrachloride	56-23-5	Carbon tet; Tetrachloromethane
Chlorobenzene	108-90-7	Monochlorobenzene; Chlorobenzol; Benzene chloride
Chloroethane	***75-00-3***	***Ethyl chloride; Chlorene; Chloryl***
Chloroethene	75-01-4	Vinyl chloride; Ethylene monochloride
Chloroform	67-66-3	Trichloromethane; Methyltrichloride; Methane trichloride
Chloromethane	***74-87-3***	***R40; Methyl chloride; Monochloromethane***
Cyclohexane	110-82-7	Hexamethylene; Hexahydrobenzene; Hexanaphthene
Dibromochloromethane	124-48-1	Chlorodibromomethane
1,2-Dibromoethane	***106-93-4***	***EDB; Ethylene dibromide***
1.2-Dichlorobenzene	95-50-1	ODB; Chloroben
1.3-Dichlorobenzene	541-73-1	meta-Dichlorobenzene; m-Phenylenedichloride
1.4-Dichlorobenzene	106-46-7	para-Dichlorobenzene; Parazene; Santochlor
1.1-Dichloroethane	75-34-3	Ethylidene chloride; Ethylidene dichloride
1.2-Dichloroethane	107-06-2	Ethylene dichloride; Glycol dichloride; 1.2-DCA
1.1-Dichloroethene	75-35-4	1.1-DCE; Vinylidene chloride
cis-1.2-Dichloroethylene	156-59-2	cis-1.2-DCE; cis-Acetylene dichloride
trans-1.2-Dichloroethylene	156-60-5	trans-1.2-DCE; trans-Acetylene dichloride
1,2-Dichloropropane	***78-87-5***	***Propylene dichloride; Propylene chloride***
cis-1.3-Dichloropropene	10061-01-5	1-Propene,1.3-dichloro-,(z)-; cis-1.3-Dichloro-1-Propene
trans-1.3-Dichloropropene	10061-02-6	trans-1.3-Dichloro-1-Propene; trans-1.3-Dichloropropylene
1,4-Dioxane	***123-91-1***	***Diethylene dioxide; Diethylene ether***
Ethyl acetate	141-78-6	Acetic acid ethyl ester; Acetic ether
Ethylbenzene	100-41-4	Ethylbenzol; Phenylethane
4-Ethyltoluene	622-96-8	1-Ethyl-4-methyl benzene; p-Methylethylbenzene
Freon 11 (CCl3F)	75-69-4	Trichlorofluoromethane; Fluorotrichloromethane; Fluorocarbon 11

Freon 12 (CCl2F2)	75-71-8	Dichlorodifluoromethane; Fluorocarbon 12
Freon 113 (C2Cl3F3)	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane; Fluorocarbon 113; 1,1,2-Trichlorotrifluoroethane
Freon 114 (C2Cl2F4)	76-14-2	1,2-Dichlorotetrafluoroethane; Halocarbon 114; 1,2-Dichloro-1,1,2,2-tetrafluoroethane
Heptane	142-82-5	Dipropylmethane; Heptyl hydride
Hexachlorobutadiene	87-68-3	1,3-Hexachlorobutadiene; Perchlorobutadiene
Hexane	110-54-3	n-Hexane; Hexyl hydride
2-Hexanone	591-78-6	Methyl butyl ketone; Butyl methyl ketone; Hexan-2-one
Isopropyl alcohol	67-63-0	2-Propanol; Isopropanol
Methylene chloride	***75-09-2***	***Dichloromethane; Methylene dichloride***
Methyl ethyl ketone	***78-93-3***	***MEK; 2-Butanone; Ethyl methyl ketone***
Methyl isobutyl ketone	108-10-1	MIBK; 2-Pentanone; Hexone; Isopropylacetone
Methyl tert-butyl ether	1634-04-4	MTBE; 2-Methoxy-2-methylpropane; tert-Butyl methyl ether
Propylene	115-07-1	Propene; Methylethylene
Styrene	100-42-5	Vinylbenzene; Phenylethylene
1,1,2,2-Tetrachloroethane	79-34-5	Tetrachloroethane; Acetylene tetrachloride; Bonoform
Tetrachloroethene	127-18-4	PCE; PERC; Perchloroethylene; Ethylene tetrachloride; Carbon bichloride; Carbon dichloride
Tetrahydrofuran	109-99-9	Diethylene oxide; Butylene oxide
Toluene	108-88-3	Toluol; Methylbenzene
1,2,4-Trichlorobenzene	120-82-1	1,2,4-Trichlorobenzol
1,1,1-Trichloroethane	71-55-6	Methyl chloroform; Trichloroethane
1,1,2-Trichloroethane	79-00-5	beta-Trichloroethane; Ethane trichloride; Vinyl trichloride
Trichloroethene	79-01-6	TCE; Acetylene trichloride; Ethinyl trichloride
1,2,4-Trimethylbenzene	95-63-6	Pseudocumene; Pseudocumol
1,3,5-Trimethylbenzene	108-67-8	Mesitylene; Trimethylbenzol
2,2,4-Trimethylpentane	540-84-1	Iso-octane; Isobutyltrimethylmethane
Vinyl acetate	108-05-4	Acetic acid ethenyl ether; Ethenyl acetate
p-Xylene	106-42-3	p-Methyltoluene; 1,4-dimethylbenzene
m-Xylene	108-38-3	m-Methyltoluene; 1,3-dimethylbenzene
o-Xylene	95-47-6	o-Methyltoluene; 1,2-Dimethylbenzene

*Laboratories use different sets and subsets of analytes on as needed basis.

NOTES:

Compounds in bold italicized letters may have poor GCMS response. These poor response compounds are evaluated using more relaxed relative response factor criteria as stated below.

Note: Naphthalene does not have poor GCMS response. Calibration criteria: RRF > 0.05 and % difference in the continuing calibration verification < 30 %.

All criteria were met _X_
Criteria were not met
and/or see below _____

V A. BLANK ANALYSIS RESULTS (Sections 1 & 2)

The assessment of the blank analysis results is to determine the existence and magnitude of contamination problems. The criteria for evaluation of blanks apply only to blanks associated with the samples, including trip, equipment, and laboratory blanks. If problems with any blanks exist, all data associated with the case must be carefully evaluated to determine whether or not there is an inherent variability in the data for the case, or if the problem is an isolated occurrence not affecting other data.

List the contamination in the blanks below. High and low levels blanks must be treated separately.

Laboratory blanks

DATE ANALYZED	LAB ID	LEVEL/ MATRIX	COMPOUND	CONCENTRATION UNITS
All_method_blank_meet_method_specific_criteria				

Field blanks

Field blanks are the same as laboratory blanks except that they are transported to and from the monitoring site, are uncapped and immediately resealed at the monitoring site, but do not actually have air pumped through them. One field blank tube is taken for every ten sampled tubes on a monitoring exercise.

Criteria:
If the same profile/pattern of VOCs is observed on the field blanks as on the sampled tubes and if the level of these components is 5% or more of the sampled volatiles, careful attention must be paid to the method of sealing the tubes and other storage procedures in future studies. If the profile of volatiles on the field blanks matches that of the sampled tubes and if the areas of the peaks on the field blank are 10% or more of sampled tube levels, the sampled tube data are invalidated.

DATE ANALYZED	LAB ID	LEVEL/ MATRIX	COMPOUND	CONCENTRATION UNITS
No_target_analyte_detected_in_the_field_blank_analyzed_with_this_data_package.				

Note:

DATA REVIEW WORKSHEETS

All criteria were met __X__
Criteria were not met
and/or see below _____

V B. BLANK ANALYSIS RESULTS (Section 3)

Blank Actions

Action Levels (ALs) should be based upon the highest concentration of contaminant determined in any blank. Do not qualify any blank with another blank. The ALs for samples which have been diluted should be corrected for the sample dilution factor, where applicable. No positive sample results should be reported unless the concentration of the compound in the samples exceeds the ALs:

ALs = 10x the amount of common contaminants (methylene chloride, acetone, 2-butanone, and toluene)
ALs = 5x for any other compounds

Specific actions are as follows:

If the concentration is < sample quantitation limit (SQL) and ≤ AL, report the compound as not detected (U) at the SQL.
If the concentration is ≥ SQL but ≤ AL, report the compound as not detected (U) at the reported concentration.
If the concentration is ≥ SQL and > AL, report the concentration unqualified.

Notes:

High and low level blanks must be treated separately
Compounds qualified "U" for blank contamination are still considered "hits" when qualifying for calibration criteria.

CONTAMINATION SOURCE/LEVEL	COMPOUND	CONC/UNITS	AL/UNITS	SQL	AFFECTED SAMPLES

All criteria were met __X__
Criteria were not met
and/or see below _____

SURROGATE SPIKE RECOVERIES

Laboratory performance of individual samples is established by evaluation of surrogate spike recoveries. All samples are spiked with surrogate compounds prior to sample analysis. The accuracy of the analysis is measured by the surrogate percent recovery. Since the effects of the sample matrix are frequently outside the control of the laboratory and may present relatively unique problems, the validation of data is frequently subjective and demands analytical experience and professional judgment.
List the percent recoveries (%Rs) which do not meet the criteria for surrogate recovery.
Matrix: solid/aqueous

SAMPLE ID	SURROGATE COMPOUND			ACTION
	~~1,2-DICHLOROETHANE-d4~~	Naphthalene-d8	~~4-BFB~~	

_Surrogate_recoveries_within_laboratory_control_limits_____
_____
_____
_____
_____
_____

QC Limits* (Air)

_____LL_to_UL_____to_____ _50__to_150_ _____to_____

* QC limits are laboratory in-house performance criteria, LL = lower limit, UL = upper limit.
* If QC limits are not available, use limits of 80 – 120 % for aqueous and 70 – 130 % for solid samples.

Actions:

QUALITY	%R < 10%	%R = 10% - LL	%R > UL
Positive results	J	J	J
Nondetects results	R	UJ	Accept

Surrogate action should be applied:

If one or more surrogate in the VOC fraction is out of specification, but has a recovery of > 10%.

If any one surrogate in a fraction shows < 10 % recovery.

All criteria were met __X__
Criteria were not met
and/or see below _____

VIII. LABORATORY CONTROL SAMPLE (LCS) ANALYSIS

This data is generated to determine accuracy of the analytical method for various matrices.

1. LCS Recoveries Criteria

Where LCS spiked with the same analyte at the same concentrations as the MS/MSD? Yes or No. If no make note in data review memo.
List the %R of compounds which do not meet the criteria

LCS ID	COMPOUND	% R	QC LIMIT

___LCS/LCSD_(Blank_spike)_analyzed_in_this_data_package;_%_recoveries_and_RPD_____
___within_laboratory_control_limits._____

* QC limits are laboratory in-house performance criteria, LL = lower limit, UL = upper limit.
* If QC limits are not available, use limits of 70 – 130 %.

Actions:

Table 9. LCS/LCSD Actions for TO-15 Analyses

Criteria	Action	
	Detected Associated Compounds	Non-detected Associated Compounds
Percent recovery Criteria		
%R > Upper Acceptance Limit (>130%)	J	No qualification
%R in the acceptable range, 70-130%	No qualification	
%R < Lower Acceptance Limit (< 70 %)	J	UJ
%R < 50%	J	R
Lower Acceptance Limit ≤ %R ≤ Upper Acceptance Limit	No qualification	
Relative Percent Difference Criteria		
% RPD ≤ 25%	No qualification	
% RPD > 25 %	J	UJ

2. Frequency Criteria:

Where LCS analyzed at the required frequency and for each matrix? Yes or No.
If no, the data may be affected. Use professional judgment to determine the severity of the effect and qualify data accordingly. Discuss any actions below and list the samples affected.

All criteria were met ___X___
Criteria were not met
and/or see below _____

IX. LABORATORY/FIELD DUPLICATE PRECISION

Sample IDs:_B13IA-2-012817/B13IA-2DUP-012817_(field)___ Matrix:___Air____
Sample IDs:_B13SS-2-012917/B13SS-2DUP-012917_(field)__ Matrix:___Air____
Sample IDs:_B15S-1-012917/B15S-1DUP-012917_(field)____ Matrix:___Air____
Sample IDs:_B15IA-1-012817/B15IA-1DUP-012817_(field)___ Matrix:___Air____
Sample IDs:_ LCS/LCSD_(laboratory)_____ Matrix:___Air____

Field/laboratory duplicates samples may be taken and analyzed as an indication of overall precision. These analyses measure both field and lab precision; therefore, the results may have more variability than laboratory duplicates which only laboratory performance. It is also expected that soil duplicate results will have a greater variance than water matrices due to difficulties associated with collecting identical field duplicate samples.

The project QAPP should be reviewed for project-specific information.
Suggested criteria: RPD ± 50% for air samples. If both samples and duplicate are <5 SQL, the RPD criteria is doubled.

COMPOUND	SQL	SAMPLE CONC.	DUPLICATE CONC.	RPD	ACTION
B13IA-2-012817/B13IA-2DUP-012817 (field)					
Naphthalene	0.060	0.036	ND	-	No action, sample/duplicate concentration < 5 x SQL
B13SS-2-012917/B13SS-2DUP-012917 (field)					
Naphthalene	2.5	ND	2.2	-	No action, sample/duplicate concentration < 5 x SQL
B15S-1-012917/B15S-1DUP-012917_(field)					
Naphthalene	2.5	2.1	1.2	-	No action, sample/duplicate concentration < 5 x SQL
B15IA-1-012817/B15IA-1DUP-012817					
Naphthalene	0.060	0.070	ND	-	No action, sample/duplicate concentration < 5 x SQL

Note: Field duplicates analyzed as part of this data set. Laboratory duplicate were within method performance criteria except for the cases described in this document. No action, sample/duplicate concentration < 5 x SQL

Laboratory duplicates RPD are within method performance criteria.

Actions:

Qualify as estimated positive results (J) and nondetects (UJ) for the compound that exceeded the above criteria. For organics, only the sample and duplicate will be qualified.

If an RPD cannot be calculated because one or both of the sample results is not detected, the following actions apply:

If one sample result is not detected and the other is greater than 5x the SQL qualify (J/UJ).

If one sample value is not detected and the other is greater than 5x the SQL and the SQLs for the sample and duplicate are significantly different, use professional judgment to determine if qualification is appropriate.

If one sample value is not detected and the other is less than 5x, use professional judgment to determine if qualification is appropriate.

If both sample and duplicate results are not detected, no action is needed.

All criteria were met __X__
Criteria were not met
and/or see below ____

X. INTERNAL STANDARD PERFORMANCE

The assessment of the internal standard (IS) parameter is used to assist the data reviewer in determining the condition of the analytical instrumentation.

List the internal standard area of samples which do not meet the criteria.

* Area of +40% or -40% of the IS area in the associated calibration standard.
* Retention time (RT) within ± 20 seconds of the IS area in the associated calibration standard.

DATE	SAMPLE ID	IS OUT	IS AREA	ACCEPTABLE RANGE	ACTION

_Internal_standard_area_and_retention_times_within_laboratory_control_limits_for_both_samples_and_calibration_standards._____

Actions:

Table 10. Internal Standard Actions for TO-15 Analyses

Criteria	Action	
	Detected Associated Compounds*	Non-detected Associated Compounds*
Area counts > 140% of CCV or mid-point standard from initial calibration)	J-	No qualification
Area counts < 60% of CCV or mid-point standard from initial calibration)	J+	R
Area counts ≥ 60% but ≤ 140% of CCV or mid-point standard from initial calibration)	No qualification	
RT difference > 20.0 seconds between samples CCV or mid-point standard from initial calibration)	R*	
RT difference < 20.0 seconds between samples and CCV or mid-point standard from initial calibration)	No qualification	

* Examine the chromatographic profile for that sample to determine if any false positives or negatives exist. For shifts of a large magnitude, the reviewer may consider partial or total rejection of the data for that sample fraction. Detects should not need to be qualified as unusable (R) if the mass spectral criteria are met.

All criteria were met __X__
Criteria were not met
and/or see below _____

XII. SAMPLE QUANTITATION

The sample quantitation evaluation is to verify laboratory quantitation results. In the space below, please show a minimum of one sample calculation:

1701454R1-08A

Naphthalene RF = 1.78438

[ ] = (21594)(36)/(503464)(1.78438)

= 0.865 ng OK

DATA REVIEW WORKSHEETS

All criteria were met __X__
Criteria were not met
and/or see below _____

XII. QUANTITATION LIMITS

A. Dilution performed

SAMPLE ID	DILUTION FACTOR	REASONS FOR DILUTION
No dilution performed.		

System Performance

Action:

Use professional judgment to qualify the data if it is determined that system performance has degraded during sample analyses. Note, for Laboratory Project Officer (PO) action, any degradation of system performance which significantly affected the data.

Note:

Overall Assessment of Data

Action:

1. Use professional judgment to determine if there is any need to qualify data which were not qualified based on the Quality Control (QC) criteria previously discussed.
2. Write a brief narrative to give the user an indication of the analytical limitations of the data. Note, for Laboratory Project Officer (PO) action, any inconsistency of the data with the Sample Delivery Group (SDG) Narrative. If sufficient information on the intended use and required quality of the data is available, the reviewer should include their assessment of the usability of the data within the given context. This may be used as part of a formal Data Quality Assessment (DQA).

Note: Results are valid; the data can be used for decision making purposes.